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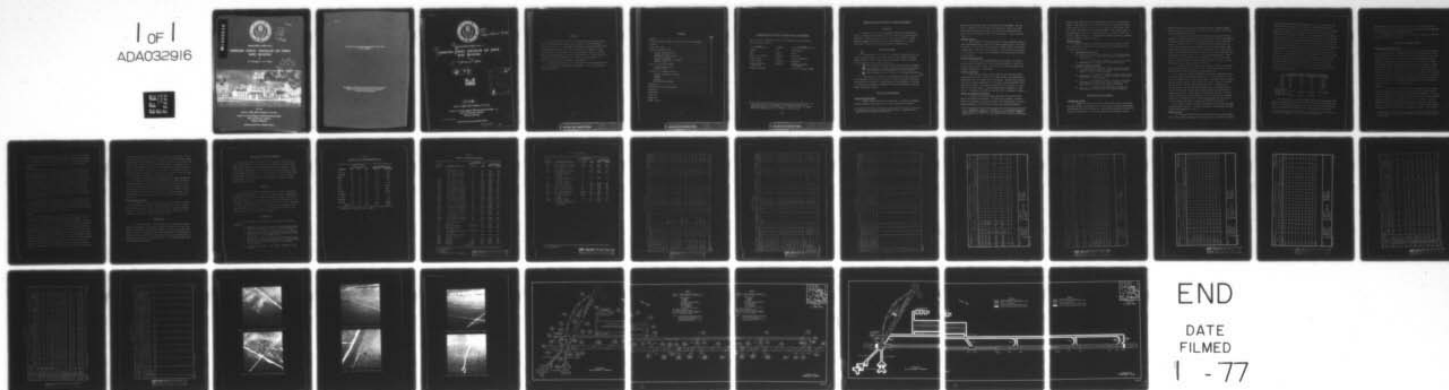
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MAY 73 H T THORNTON, P J VEDROS

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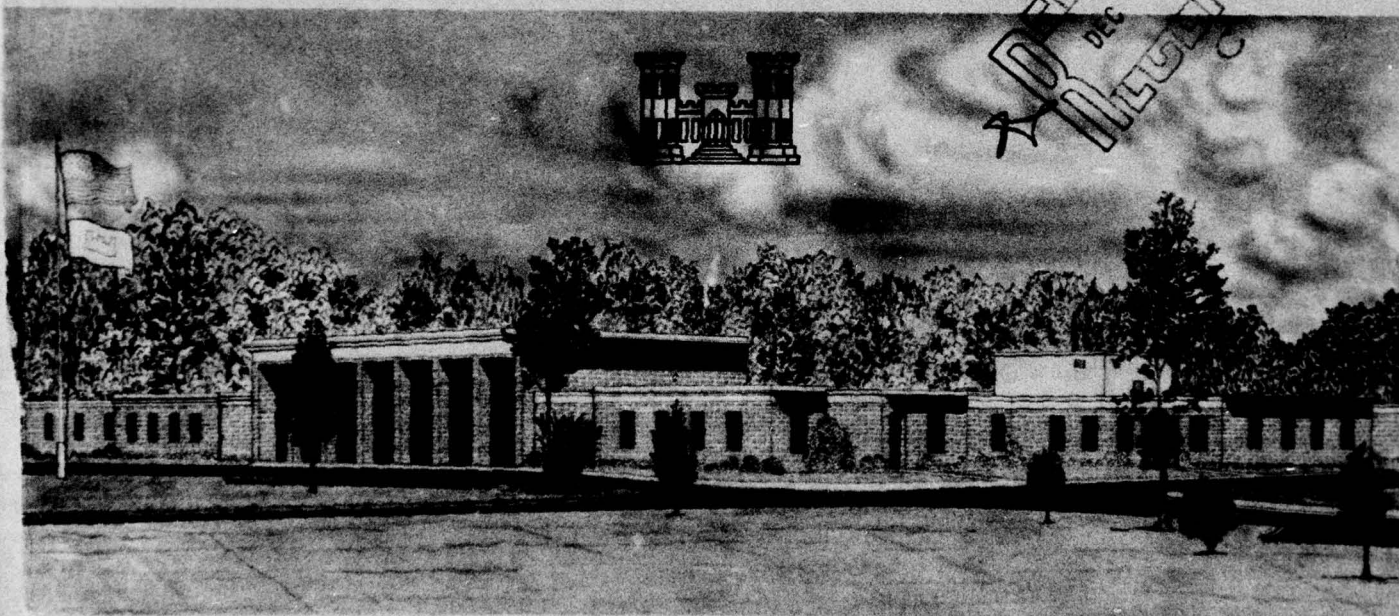
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# CONDITION SURVEY, KINCHELOE AIR FORCE BASE, MICHIGAN

by

H. T. Thornton, Jr., P. J. Vedros

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May 1973

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Conducted by U. S. Army Engineer Waterways Experiment Station  
Soils and Pavements Laboratory  
Vicksburg, Mississippi

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H. T. Thornton, Jr. / P. J. Vedros

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### Foreword

The study reported herein was conducted under the general supervision of the Engineering Design Criteria Branch, Soils and Pavements Laboratory, of the U. S. Army Engineer Waterways Experiment Station (WES), Vicksburg, Mississippi. Personnel involved in the condition survey were Messrs. H. T. Thornton, Jr., R. N. Gordon, Sr., and S. J. Alford. This report was prepared by Messrs. Thornton and P. J. Vedros under the general supervision of Messrs. J. P. Sale, R. G. Ahlvin, and R. L. Hutchinson of the Soils and Pavements Laboratory.

COL Ernest D. Peixotto, CE, was Director of the WES during the conduct of the study and preparation of the report. Mr. F. R. Brown was Technical Director.

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Conversion Factors, British to Metric Units of Measurement

British units of measurement used in this report can be converted to metric units as follows:

<u>Multiply</u>	<u>By</u>	<u>To Obtain</u>
inches	2.54	centimeters
feet	0.3048	meters
miles (U.S. statute)	1.609344	kilometers
square inches	6.4516	square centimeters
pounds (mass)	0.45359237	kilograms
pounds (force) per square inch	0.6894757	newtons per square centimeter
Fahrenheit degrees	*	Celsius or Kelvin degrees

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\* To obtain Celsius (C) temperature readings from Fahrenheit (F) readings, use the following formula:  $C = (5/9)(F - 32)$ . To obtain Kelvin (K) readings, use:  $K = (5/9)(F - 32) + 273.15$ .



## CONDITION SURVEY, KINCHELOE AIR FORCE BASE, MICHIGAN

### Authority

1. Authority for conducting condition surveys at selected airfields is contained in amendment to FY 1972 RDTE Funding Authorization (MFS-MC-5, 16 February 1972), subject: "Air Force Airfield Pavement Research Program," from the Office, Chief of Engineers, U. S. Army, Directorate of Military Construction, dated 18 February 1972.

### Purpose and Scope

2. The purpose of this report is to present the results of a condition survey performed at Kincheloe Air Force Base (KAFB), Michigan, during 27-29 April 1972. The following three major areas of interest were considered in this condition survey:

- > (1) The structural condition of the primary airfield pavements.
- > (2) The condition of pavement repairs and the types of maintenance materials that have been used at this airfield.
- > (3) Any detrimental effects of frost to the pavement facilities.

3. This report is limited to a presentation of visual observations of the pavement conditions, discussion of these observations, and pertinent remarks with regard to the performance of the pavements. No physical tests of the pavements, foundations, or patching materials were performed during this survey.

### Pertinent Background Data

#### Location and topography

4. KAFB, formerly Kinross Air Force Base, is located in Chippewa County, Michigan, approximately 2-1/2 miles\* southeast of Kinross,

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\* A table of factors for converting British units of measurement to metric units is presented on page vii.

Michigan, and 18 miles south of Sault Ste. Marie, Michigan. The airfield is situated on a relatively flat sandy plain, which lies some 80 ft above the surrounding area. The elevation of the airfield is about 790 ft above mean sea level. A vicinity map is shown in plates 1 and 2.

#### Geology and soils

5. The airfield is underlain by thinly bedded limestone strata of Ordovician-Richmond age, which have a slight regional dip to the south. The bedrock is covered by a thin veneer of clayey, glacial till and uncemented sand. The soil at the airfield is a loose uniform sand, which is classified as an SP material according to the Unified Soil Classification System.\*

#### Drainage and water table

6. The sandy soil is predominantly free draining. The water table occurs at a depth of 10 to 20 ft below the surface. Due to the pervious nature of the natural soil, the use of field tile drains and pavement edge drains is unnecessary.

#### Climatic conditions

7. KAFB weather station records indicate that the mean annual temperature of the area is about 41 F, with monthly mean temperatures ranging from 14 F in January to 65 F in August. Records also show that an absolute maximum temperature of 94 F and an absolute minimum of -33 F have been recorded. The average annual rainfall is about 35 in. Winters are long and rigorous, and the average annual snowfall is about 110 in. A tabulation of climatic data for 1971 is presented in table 1.

#### General description of airfield

8. In April 1972, the airfield facilities consisted of both heavy- and light-load pavements. The heavy-load pavements included a NW-SE (15-33) runway, a parallel taxiway, two warm-up aprons, four connecting taxiways, a SAC operational apron and connecting taxiways,

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\* U. S. Department of Defense, "Unified Soil Classification System for Roads, Airfields, Embankments, and Foundations," Military Standard MIL-STD-619B, June 1968, U. S. Government Printing Office, Washington, D. C.

hangar access aprons and connecting taxiways, and SAC alert aprons and taxiway. The runway was 300 ft wide and 12,000 ft long; the SAC operational apron was 700 ft wide and 2,185 ft long; and the taxiways were 75 ft wide. The light-load pavements included an ADC parking apron, an ADC operational apron, and connecting taxiways. A layout of the airfield is shown in plate 1. A pavement plan indicating the type pavement on each facility is shown in plate 2.

#### Previous reports

9. Previous reports concerning the airfield facilities at KAFB are listed below. Pertinent data were extracted from them for use in this condition survey.

#### 10. Condition survey reports:

- a. Ohio River Division Laboratories, CE, "Condition Survey Report, Kinross Air Force Base, Michigan," November 1958, Cincinnati, Ohio.
- b. \_\_\_\_\_, "Condition Survey Report, Kincheloe Air Force Base, Michigan," September 1966, Cincinnati, Ohio.

#### 11. Pavement evaluation reports:

- a. U. S. Army Engineer District, Detroit, CE, "Final Report, Airfield Pavement Evaluation, Kinross Airport, Kinross, Michigan," 1944, Detroit, Michigan.
- b. \_\_\_\_\_, "Evaluation of Flexible Pavement, Extension of Northwest-Southeast Runway, Kinross Air Force Base, Michigan," 1954, Detroit, Michigan.
- c. \_\_\_\_\_, "Evaluation of Flexible Pavement, Alert Taxiway Extension and Rear Access Apron, Kinross Air Force Base, Michigan," August 1958, Detroit, Michigan.
- d. \_\_\_\_\_, "Airfield Evaluation Report, Kincheloe Air Force Base, Michigan," March 1960, Detroit, Michigan.

### History of Airfield Pavements

#### Construction history

12. During the period July-October 1942, three runways, peripheral and stub taxiways, turnarounds, and an operational apron were constructed. The pavement of these facilities was 6-in. portland cement concrete (PCC), which was thickened to 9 in. at the longitudinal construction joints,



transverse expansion joints, and longitudinal edges. These pavements were designed to support a gross aircraft load of 30,000 lb with a tire inflation pressure of 44 psi.

13. During the period May-October 1952, the following were constructed: a 1,680-ft extension to the southeast end of the NW-SE runway, a taxiway extension paralleling and then connecting to this runway extension, an alert apron, and a 60-ft-wide by 695-ft-long taxiway connecting the alert apron to the northwest end of the NW-SE runway. Two triangular areas were also added to the operational apron at the junctures of the apron and connecting taxiways. All of these pavements were of flexible pavement construction. During May-September 1956, a rear access apron was constructed, and an extension was added to the alert taxiway. These pavements were designed to support a 25,000-lb, single-wheel load having a tire pressure of 200 psi.

14. In 1957, the NW-SE runway was extended 1,800 ft at the southeast end with uniform 9- and 10-in. PCC. The parallel taxiway was extended 2,596 ft at the northwest end with 10-in. PCC.

15. During the period 1957-1959 the runway was strengthened, and additional extensions, taxiways, aprons, etc., were constructed. Pavements constructed at this time were designed to support a 265,000-lb gear load on twin-twin wheels spaced 37-62-37 in. with a 267-sq-in. contact area per wheel. The SAC hangar access aprons were designed for a 160,000-lb gear load with the same configuration as indicated above for the 265,000-lb load. The ADC alert access taxiway was constructed to support a 25,000-lb, single-wheel load with a tire pressure of 200 psi. The SAC hangar access apron extensions (5 and 6) and the south warm-up apron were constructed in 1961 to the same heavy-load design criteria as the pavements designed to support the 265,000-lb gear load.

16. Details of the construction history of the airfield pavements are presented in table 2. Pavement thicknesses, descriptions, and other details are presented in table 3.

#### Traffic history

17. A detailed traffic record was available for the period 1966-1971. Some traffic information for the period prior to 1966 is available

in the reports referenced in paragraphs 10 and 11. The earliest aircraft traffic data date back to July 1953, when F-94 aircraft were stationed at the airfield. The F-94 aircraft operated at the base until April 1954, averaging on the order of 500-600 cycles\* of traffic per month. The F-89 aircraft replaced the F-94 and averaged about 600-700 cycles per month. Traffic records for August 1956-August 1957 indicate that about 825 cycles per month by military aircraft and 160 cycles per month by civilian aircraft were applied at the airfield. About 95 percent of the military aircraft traffic was from F-89 and F-102 operations. The predominant civilian aircraft using the field was the DC-3. The date that B-52's began operating at KAFB was not available, but it is assumed to be about 1960. In 1965, aircraft traffic consisted of about 80 cycles per month by B-52 and KC-135 aircraft, 60 cycles per month by T-33 aircraft, and about 250 cycles per month by F-106 aircraft. The average gross operating load of the B-52 during this time was 410,000 lb and of the KC-135 was 225,000 lb. The detailed traffic record for the period 1966-1971 is tabulated below. Portions of this record have been estimated.

Year	Cycles of Operation per Type of Aircraft			
	Heavy Bomber	Tanker	Heavy Cargo	All Others
1966	895	842	49	5,869
1967	860	640	48	4,066
1968	756	536	68	1,552
1969	654	554	25	1,577
1970	780	565	20	1,750
1971	947	602	11	2,080
Average takeoff weight, lb	400,000	250,000	195,000	6,000-70,000
Average landing weight, lb	250,000	145,000	80,000	--

18. The records indicate that there have been approximately 70-80 cycles per month of B-52 traffic and 50-70 cycles of KC-135 traffic applied on the pavements during alert exercises. During these exercises, the B-52's approach the northwest end of the runway, taxi down the

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\* A cycle of operation is one landing and one takeoff.

runway, turn off at taxiway 9, and return to their parking positions. The KC-135's taxi down the length of the runway and the parallel taxiway, and then return to their parking positions.

19. Approximately 60 percent of the takeoffs at KAFB are from the northwest (15) end of the runway.

### Conditions of Pavement Surfaces

#### Pavement inspection procedure

20. The following procedure was used in conducting the inspection of the rigid pavements. Representative features were selected for detailed inspection. The features were then inspected slab\* by slab, and the defects were recorded. The locations of the individual pavement features, the inspection starting points, and the directions in which the pavements were inspected (shown by arrows) are indicated in plate 1. The results of the rigid pavement survey for those features that were inspected in detail are presented in table 4. This table shows a quantitative breakdown of the various types of defects and a condition rating for each pavement feature inspected in detail. The procedures used for determining the condition rating of a pavement are given in Appendix III of Department of the Army Technical Manual TM-827-3, "Rigid Airfield Pavement Evaluation," dated September 1965.

#### Runway

21. As is noted in tables 3 and 4, the pavements of the runway consist of various thicknesses of PCC and reinforced portland cement concrete (RPCC), as well as PCC overlays and RPCC overlays. All of the runway pavements were in excellent structural condition. The only pavements that contained major defects (11 slabs with transverse cracks) were the 14-in. RPCC overlay pavements located between sta 10+00 and 50+00. As is indicated in table 4, there were a number of minor defects (mostly spalls and pop-outs) in the pavement surfaces. Spall repairs

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\* A slab is the smallest unit, containing no joints, of a given pavement feature.



made with PCC and grout were more numerous from sta 10+00 to 50+00 than in other areas of the runway. Some of the repaired spalls were performing satisfactorily, and some were showing signs of slight deterioration (see photos 1 and 2). The pop-outs had also been patched with PCC.

#### Taxiways

22. The parallel taxiway was in excellent condition except for one area about 500 ft southeast of taxiway 9, where 16 slabs contained major structural defects. In the 1966 survey, there were 12 slabs in this area that contained major structural defects. The increase in defects has been mostly in the form of diagonal cracks. The remainder of the primary taxiway system was in excellent condition, with only four slabs in SAC operational apron access taxiway 2 and two slabs in SAC alert taxiway 2 having a major structural defect. A small number of minor defects, such as spalls and pop-outs, were recorded. The thicknesses of the pavements of the primary taxiways were 21 in. and of the SAC alert taxiways were 20 in.

23. The SAC hangar apron access taxiway was not surveyed in detail but was generally in a spalled condition, with some slabs containing structural defects. The condition of this taxiway was rated as fair to good. The ADC alert facility, the ADC hangar access apron, and taxiway B have been closed to traffic for some time.

#### Aprons

24. Approximately one-half of the SAC operational apron was not accessible for a detailed study due to parked alert aircraft. As is noted in table 4, 1080 of the total 2142 slabs were surveyed. The pavement is 17 in. thick in the apron area. No major defects were recorded in the area surveyed. About 3 percent of the slabs surveyed contained minor defects such as spalls or pop-outs. Some longitudinal and transverse joint spalls had been patched with epoxy concrete, and the patches appeared to be performing satisfactorily. A cursory examination of the portion of the apron that was not surveyed in detail indicated that some of the slabs showed signs of structural cracks and some scaling and spalling. The distress was observed in the slabs beneath the parked aircraft. The north and south warm-up aprons and the SAC alert parking

stubs were in excellent condition, with a total of only 5 slabs containing a major structural defect. Minor defects in the north warm-up apron were very few, except for pop-outs in about 15 percent of the slabs. The large number of pop-outs in the north warm-up apron (as compared with those in other areas) may be due to its extensive use during alert exercises. The aircraft tend to utilize this area in taxiing to and from the parking areas and normally have to pause in the area before crossing over the runway and returning to the SAC alert stubs.

25. The ADC parking apron and operational apron were constructed in 1942 of 9-6-9-in. PCC. These aprons contained a moderate number of structural defects, pop-outs, and spalls. The PCC that has been used to patch the spalls and pop-outs has performed satisfactorily. Epoxy material has been tried on some of the spalls, but the patches have become unbonded and have had to be replaced. These aprons receive only light traffic and are considered to be in fair to poor condition (see photos 3-5).

#### Miscellaneous pavements

26. Taxiways 9 and 11 were surveyed in detail and were in excellent condition. The asphaltic concrete shoulders and blast pavements were in good condition, with only a minor amount of shrinkage cracking occurring. Some of the larger cracks, such as the longitudinal crack (photo 6) on the north overrun, need to be sealed.

#### Maintenance

27. A large reduction in maintenance costs at KAFB was realized with the curtailment of use of the taxiways and aprons in the ADC area. Most of the airfield maintenance now consists of repairing pop-outs and spalls with PCC on an in-house basis when time permits or when necessitated by hazardous conditions. Epoxy patches have not performed well in this area, so they are no longer being used. PCC patches are used, and they perform satisfactorily.

### Condition of Joint Seal Materials

28. At the time of this survey, the joint seal material was in fair to good condition. During August and September 1972, joint seal material was applied on the runway and primary taxiway system. Joint seal material conforming to Federal Specification SS-S-1614 was applied to the taxiway and runway ends and to the north and south warm-up aprons. The remainder of the runway, the parallel taxiway, and the connecting taxiways were sealed with a joint seal material conforming to Federal Specification SS-S-1401.

### Evaluation

29. The latest pavement evaluation report for KAFB was prepared in 1960 (see paragraph 11d). Since some changes in gear configurations and methods of evaluation have been made since that time, a new evaluation table (table 5) has been prepared. The physical properties of the materials as determined in previous evaluations were used for determining the load-carrying capabilities of the pavements. An evaluation for the frost-melting period was not made, since the subgrade at KAFB is considered to be a nonfrost-susceptible material.

### Conclusions

30. The following remarks summarize the findings of the 1972 inspection:

- a. The primary pavements subjected to heavy loading are performing satisfactorily and are in excellent condition.
- b. There has been very little progression in the number and degree of defects in the portion of the parallel taxiway near taxiway 9 since the 1966 survey.
- c. Minor defects, such as pop-outs and spalls, have not developed into a major maintenance problem at this airfield. The PCC used for patching appears to be performing satisfactorily.
- d. There are no drainage or frost damage problems at this airfield.



Table 1  
Climatic Data,\* January-December 1971

Month	Average Daily Temperature, F			Precipitation, in.	
	Max	Min	Mean	Rainfall	Snowfall
January	21	6	14	2.7	27.7
February	24	7	16	1.5	18.4
March	32	15	24	2.1	16.1
April	47	30	39	2.8	3.3
May	60	39	50	2.7	0.3
June	71	49	60	3.0	Trace
July	75	53	64	3.2	None
August	75	54	65	3.8	Trace
September	64	46	55	4.0	0.3
October	55	38	47	2.1	1.9
November	40	27	34	3.6	16.3
December	<u>27</u>	<u>13</u>	<u>20</u>	<u>4.2</u>	<u>25.5</u>
Annual	49	31	41	35.7	109.8

\* Furnished by weather station at KAFB.

Table 2  
Airfield Construction History

Feature No.	Pavement Facility	Pavement		Construction	
		Thickness in.	Type	Year	Agency
	NW-SE runway				
	Sta 0+00 to 55+00	6	PCC	1942	CE†
	Sta 55+00 to 71+80	3	AC	1952	CE
	Sta 71+80 to 80+00	9	PCC	1957	CE
	Sta 80+00 to 89+80	10	PCC	1957	CE
R1A	Sta 0+00 to 5+00*	24	PCC	1958	CE
R2B	Sta 0+00 to 5+00*	22	PCC	1958	CE
R3B	Sta 5+00 to 10+00*	22	PCC	1958	CE
R13D	Sta 5+00 to 10+00*	14	RPCC	1958	CE
R4C	Sta 10+00 to 50+00**	14	RPCC	1958	CE
R14D	Sta 10+00 to 50+00**	14	PCC	1958	CE
R5C	Sta 50+00 to 55+00*	20	PCC	1958	CE
R12C	Sta 70+40 to 72+00*	20	PCC	1958	CE
R15D	Sta 50+00 to 55+00*	14	RPCC	1958	CE
R6C	Sta 55+00 to 70+40**	12	RPCC	1958	CE
R16D	Sta 55+00 to 70+40**	12	PCC	1958	CE
R17D	Sta 70+40 to 72+00*	14	PCC	1958	CE
R7C	Sta 72+00 to 80+00**	12	PCC	1958	CE
R18D	Sta 72+00 to 80+00**	12	PCC	1958	CE
R8C	Sta 80+00 to 89+80**	12	PCC	1958	CE
R19D	Sta 80+00 to 89+80**	12	PCC	1958	
R9C	Sta 89+80 to 110+00	17	PCC	1959	CE
R20D	Sta 89+80 to 115+00 and 120+00	15	PCC	1959	CE
R10B	Sta 110+00 to 115+00	20	PCC	1959	CE
R11A	Sta 115+00 to 120+00	21	PCC	1959	CE
T1A	South connecting taxiway	21	PCC	1959	CE
T2A	Parallel taxiway	20-21-20	PCC	1959	CE
T3A	North connecting taxiway*	21	PCC	1959	CE
T4A	SAC operational apron taxiway	17-21-17	PCC	1959	CE
T5A	SAC operational apron	21	PCC	1959	CE
T10A	access taxiways				
T6C	Taxiway 11	17	PCC	1959	CE
T15C	Taxiway 9	17	PCC	1959	CE
T7B	Taxiway A	9-6-9	PCC	1942	CE
T12B	Taxiway B	9-6-9	PCC	1942	CE

(Continued)

\* Reconstruction.

\*\* Overlay.

† CE denotes Corps of Engineers.

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Table 2 (Concluded)

Feature No.	Pavement Facility	Pavement		Construction	
		Thickness in.	Type	Year	Agency
T11B	ADC connecting taxiway	9-6-9	PCC	1942	CE
T8B	ADC alert apron access taxiway	10	PCC	1959	CE
A1B	SAC operational apron	17	PCC	1959	CE
A2B	SAC hangar access aprons (1-4) and taxiway	14	PCC	1959	CE
A2B	SAC hangar access aprons (5 and 6) and taxiway extension	14	PCC	1961	CE
A3B	SAC alert aprons	20	PCC	1959	CE
T9B	SAC alert taxiways	20	PCC	1959	CE
A4B	North warm-up apron*	20	PCC	1959	CE
A5B	South warm-up apron	20	PCC	1961	CE
A7B	ADC operational apron	9-6-9	PCC	1942	CE
A6B	ADC parking apron	9-6-9	PCC	1942	CE
A8B	ADC hangar access apron	9-6-9	PCC	1942	CE
A9B	ADC alert apron	3	AC	1952	CE
T13B	ADC alert taxiway extension and rear access apron	3	AC	1956	CE

\* Reconstruction.

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TABLE 3  
SUMMARY OF PHYSICAL PROPERTY DATA

FACILITY	OVERLAY PAVEMENT		PAVEMENT		BASE		SUBGRADE		GENERAL CONDITION OF AREA OR CONSIDERED
	THICK. IN.	DESCRIPTION	FLEX. STR. PSI	THICK. IN.	DESCRIPTION	FLEX. STR. PSI	THICK. IN.	CLASSIFICATION	CBR OR K
FACILITY NUMBER AND IDENTIFICATION	LENGTH FT.	WIDTH FT.							
81A W-SE runway, lat 500 ft; sta 0+00 to 5+00, east side	500	200			Portland cement concrete	800	24	Sand (SP)	300
82B W-SE runway, lat 500 ft; sta 0+00 to 5+00, 100-ft width, west side	500	100			Portland cement concrete	800	22	Sand (SP)	300
83B W-SE runway, 2nd 500 ft; sta 5+00 to 10+00	500	110			Portland cement concrete	800	22	Sand (SP)	300
813D W-SE runway, 2nd 500 ft; sta 5+00 to 10+00, outside edges	500	95			Portland cement concrete reinforced	800	14	Sand (SP)	300
812C W-SE runway interior sta 10+00 to 50+00	4,000	110		14	Portland cement concrete reinforced (0.17%) $h_E = 16.9$	800	6	Stabilized gravel (GW)	250
811D W-SE runway interior sta 10+00 to 50+00, outside edges	4,000	95		14	Portland cement concrete	800	6	Sand (SP)	300
85C W-SE runway interior sta 50+00 to 59+00	500	212			Portland cement concrete	800	20	Sand (SP)	300
815D W-SE runway interior sta 50+00 to 59+00, west side	500	90			Portland cement concrete reinforced	800	14	Sand (SP)	300
86C W-SE runway interior sta 59+00 to 70+00	1,140	120		12	Portland cement concrete reinforced (0.28%) $h_E = 15.5$	800	3	Stabilized gravel (GW)	CBR-50
815D W-SE runway interior sta 59+00 to 70+00, outside edges	1,140	90		12	Portland cement concrete	800	3	Stabilized gravel (GW)	CBR-50
812D W-SE runway interior sta 70+00 to 72+00	160	110			Portland cement concrete	800	20	Sand (SP)	300
817D W-SE runway interior sta 70+00 to 72+00, outside edges	160	95			Portland cement concrete	800	14	Sand (SP)	300
87C W-SE runway interior sta 72+00 to 80+00	800	120		12	Portland cement concrete	800	9	Sand (SP)	200
815D W-SE runway interior sta 72+00 to 80+00, outside edges	800	90		12	Portland cement concrete $h_E = 17.3$	800	9	Sand (SP)	200
85C W-SE runway interior sta 80+00 to 89+00	980	120		12	Portland cement concrete $h_E = 18$	800	10	Sand (SP)	200

\* Equivalent thickness.

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Table 3 (Continued)  
SUMMARY OF PHYSICAL PROPERTY DATA

FACILITY				OVERLAY PAVEMENT			PAVEMENT			BASE		SUBGRADE		GENERAL CONDITION OF AREA CONSIDERED
Kincheloe AFB, Mich.	FACILITY NUMBER AND IDENTIFICATION	LENGTH FT	WIDTH FT	THICK. IN.	DESCRIPTION	FLEX. STR PSI	THICK. IN.	DESCRIPTION	FLEX. STR PSI	THICK. IN.	CLASSIFICATION	CBR OR K		
R19D	NW-SE runway interior sta 80+00 to 89+80, outside edges	980	90	12	Portland cement concrete	800	10	Portland cement concrete	750		Sand (SP)	300	Excellent	
R9C	NW-SE runway interior sta 89+80 to 110+00	2,000	100				17	Portland cement concrete	750		Sand (SP)	300	Excellent	
R10B	NW-SE runway, 2nd 500 ft; sta 110+00 to 115+00	500	100				20	Portland cement concrete	750		Sand (SP)	300	Excellent	
R11A	NW-SE runway, 1st 500 ft; sta 115+00 to 120+00	500	200				21	Portland cement concrete	750		Sand (SP)	300	Excellent	
R20B	NW-SE runway, sta 89+80 to 120+00, west side, and sta 89+80 to 115+00, east side	3,000 2,500	100 100				15	Portland cement concrete	750		Sand (SP)	300	Excellent	
T1A	South connecting taxiway	934	75				21	Portland cement concrete	750		Sand (SP)	300	Excellent	
T2A	Parallel taxiway	10,500+	75				20-21-20	Portland cement concrete	750		Sand (SP)	300	Excellent	
T3A	North connecting taxiway	1,022	75				21	Portland cement concrete	810		Sand (SP)	300	Excellent	
T4A	SAC operational apron taxiway	1,910+	75				17-21-17	Portland cement concrete	770		Sand (SP)	300	Excellent	
T5A	SAC operational apron taxiways (2)	250	75				21	Portland cement concrete	770		Sand (SP)	300	Excellent	
T6B A3B	SAC alert taxiways 1 & 2 and alert aprons	Varies	Varies				20	Portland cement concrete	750		Sand (SP)	300	Excellent	
A1B	SAC operational apron	2,185	700				17	Portland cement concrete	770		Sand (SP)	300	Excellent	
A1B	North warm-up apron	600+	250+				20	Portland cement concrete	800		Sand (SP)	300	Excellent	
A2B	South warm-up apron	600+	250+				20	Portland cement concrete	750		Sand (SP)	300	Excellent	
A2B	SAC hangar access aprons (1-4) & taxiway SAC hangar access apron extension (5 & 6)	Varies	Varies				14	Portland cement concrete	750		Sand (SP)	300	Fair	
T7B T12B T11B	Taxiway A Taxiway B APC connecting taxiway	1,700+ 1,700+ 350	50 50 75				9-5-9	Portland cement concrete	850	5	Stabilized aggregate (SW)	250	Fair to poor	
T15C T6C	Taxiway 9 Taxiway 11	600 600	75 75				21	Portland cement concrete	770		Sand (SP)	300	Excellent	
T6B	APC alert taxiway	600+	75				10	Portland cement concrete	770		Sand (SP)	300	Fair	

(9 of 3 sheets)

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Table 4

DATE: April 1972

SUMMARY OF DATA - RIGID PAVEMENT CONDITION SURVEY

AIRFIELD:  
CHICKADEE AFB, MISS.

FEATURE		SLAB SIZE FT	APPROX NO. OF SLABS	PAVE. THICK. IN.	NO. OF SLABS CONTAINING INDICATED DEFECTS		% OF SLABS NO DEFECTS	% OF SLABS NO MAJOR DEFECTS	CONDI- TION																
NO.	DESCRIPTION				I	-	\	Δ	*	K	w	S	J	ψ	J	⊕	M	P	O	C	D				
R1A	NW-SE runway: 15	20 by 22	350	22 &											2	1			6		1		97	100	Excel-
R2B	end, 1st 500 ft	20 by 14		24																					lent
R3B	NW-SE runway: 15	20 by 22	350	14 re-											7				19				91	100	Excel-
R13D	end, 2nd 500 ft	20 by 14		inf &											2										lent
R4C	NW-SE runway, sta	20 by 22	2800	14/6 &											4		3		160		3		92	99	Excel-
R14D	10+00 to 50+00	20 by 14		14 re-	11						6														lent
R5C	NW-SE runway, sta	20 by	400	14 re-											7				33				88	100	Excel-
R15D	50+00 to 55+0	21'4" 15 by 21'4"		inf & 20																					lent
R6C	NW-SE runway, sta	20 by	1232	12 re-											12				94				89	100	Excel-
R16D	55+00 to 70+10	21'4" 15 by 21'4"		inf & 12							1	2	10	14											lent
R12C	NW-SE runway, sta	20 by	128	14 &															6				91	100	Excel-
R17D	70+10 to 72+00	21'4" 15 by 21'4"		20											5										lent
REMARKS:																									

LEGEND:

I LONGITUDINAL CRACK  
- TRANSVERSE CRACK  
\ DIAGONAL CRACK  
Δ CORNER BREAK  
\* SHATTERED SLAB  
K KEYED JOINT FAILURE

SHRINKAGE CRACK

w SCALING  
S SPALL ON TRANSVERSE JOINT

J SPALL ON LONGITUDINAL JOINT  
ψ CORNER SPALL  
⊕ SETTLEMENT

MAP CRACKING

P PUMPING JOINT  
O POP-OUT  
C UNCONTROLLED CONTRACTION CRACK  
D "D" CRACKING

LEGEND:

I	LONGITUDINAL CRACK	w	SHRINKAGE CRACK	M	MAP CRACKING
-	TRANSVERSE CRACK	S	SCALING	P	PUMPING JOINT
\	DIAGONAL CRACK	J	SPALL ON TRANSVERSE JOINT	O	POP-OUT
Δ	CORNER BREAK	ψ	SPALL ON LONGITUDINAL JOINT	C	UNCONTROLLED CONTRACTION CRACK
*	SHATTERED SLAB	⊕	CORNER SPALL	D	"D" CRACKING
K	KEYED JOINT FAILURE		SETTLEMENT		

DATE: April 1972

SUMMARY OF DATA - RIGID PAVEMENT CONDITION SURVEY

AMFIELD  
Litchfield, Ill., Mich.

FEATURE		SLAB SIZE FT	APPROX NO. OF SLABS	PAVE. THICK. IN.	NO. OF SLABS CONTAINING INDICATED DEFECTS													No. of SLABS NO DEFECTS	No. of SLABS NO DEFECTS	COMPARISON																																																																																																																																																																																																																																																																																																																																																																																																																																			
NO.	DESCRIPTION				I	1	2	3	4	5	6	7	8	9	10	11	12				13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350	351	352	353	354	355	356	357	358	359	360	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378	379	380	381	382	383	384	385	386	387	388	389	390	391	392	393	394	395	396	397	398	399	400	401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416	417	418	419	420	421	422	423	424	425	426	427	428	429	430	431

2004  
NES FORM NO.

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Table 4 (Continued)

DATE: April 1972

SUMMARY OF DATA - RIGID PAVEMENT CONDITION SURVEY

AIRFIELD:  
MICHIGAN AFB, MICH.

NO.	FEATURE	SLAB SIZE FT	APPROX NO. OF SLABS	PAVE THICK. IN.	NO. OF SLABS CONTAINING INDICATED DEFECTS																% OF SLABS NO DEFECTS	% OF SLABS NO DEFECTS	CONDITION
					I	-	\	Δ	*	K	~	S	J	J	⊕	M	P	O	C	D			
T9B	SAC alert taxiway 1	25 by 25	300	20											5			9			95	100	Excel- lent
T9B	SAC alert taxiway 2	25 by 25	256	20		2							1	1	6			7			93	99	Excel- lent
T5A	SAC operational apron access taxiway 2	25 by 25	50	21	2	1		1						2	2						84	92	Excel- lent
T10A	SAC operational apron access taxiway 1	25 by 25	49	21											7						86	100	Excel- lent
T4A	SAC operational apron taxiway	25 by 25	360	17- 21-									2	1	1			4			98	100	Excel- lent
A1B	SAC operational apron	25 by 25	1050*	17									1	7	7			13		3	97	100	Excel- lent
A3B	SAC alert stubs 1-9	25 by 25	623	20	2	1						1		1	3			9	2		97	99	Excel- lent
A4B	North warm-up apron	25 by 25	274	20	1							2		3	1	4		36	1		84	99	Excel- lent
A5B	South warm-up apron	25 by 25	249	20				1							3			7			95	99	Excel- lent
T15C	Taxiway 9	25 by 25	134	17		2									2			10			91	99	Excel- lent

REMARKS: \* 1080 slabs surveyed out of total of 2142 slabs.

LEGEND:		SHRINKAGE CRACK		MAP CRACKING	
I	LONGITUDINAL CRACK	~	SCALING	P	PUMPING JOINT
-	TRANSVERSE CRACK	S	SPALL ON TRANSVERSE JOINT	O	POP-OUT
\	DIAGONAL CRACK	J	SPALL ON LONGITUDINAL JOINT	C	UNCONTROLLED CONTRACTION CRACK
Δ	CORNER BREAK	⊕	CORNER SPALL	D	"D" CRACKING
*	SHATTERED SLAB		SETTLEMENT		
K	KEYED JOINT FAILURE				

REMARKS: \* 1080 slabs surveyed out of total of 2142 slabs.

LEGEND:

I	LONGITUDINAL CRACK	W	SHRINKAGE CRACK	M	MAP CRACKING
-	TRANSVERSE CRACK	S	SCALING	P	PUMPING JOINT
\	DIAGONAL CRACK	J	SPALL ON TRANSVERSE JOINT	O	POP-OUT
Δ	CORNER BREAK	J	SPALL ON LONGITUDINAL JOINT	C	UNCONTROLLED CONTRACTION CRACK
*	SHATTERED SLAB	⊕	CORNER SPALL	D	"D" CRACKING
K	KEYED JOINT FAILURE		SETTLEMENT		

WES FORM NO. 2004  
JUN 1972

(3 of 4 sheets)

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Table 4 (Concluded)

[illegible]

Table 5  
SUMMARY OF PAVEMENT EVALUATION

NAME OF AIRFIELD: Kincheloe AFB			LOAD-CARRYING CAPACITY IN LB OF GROSS PLANE LOAD FOR INDICATED LANDING GEAR TYPES AND CONFIGURATIONS														REMARKS
DATE OF EVALUATION MONTH: April YR: 1972			FEATURE DESIGNATION	PAVEMENT OPERATIONAL USE	TRICYCLE ARRANGEMENT										BICYCLE		
NO.					SINGLE 100-PSI TIME PRESSURE	SINGLE 100-PSI CONTACT AREA	SINGLE 241-50 IN. CONTACT AREA	TR 28 IN. C-C 226-50 IN. CONTACT AREA EACH TIME	SINGLE TANDUM 400-PSI CONTACT AREA	TR 37 IN. C-C 287-50 IN. CONTACT AREA EACH TIME	TR 44 IN. C-C 353-50 IN. CONTACT AREA EACH TIME	TWIN TANDUM 55 IN. + 55 IN. 208-50 IN. CONTACT AREA EACH TIME	C-54 GEAR CONFIGURATION	TWIN TWIN SPCG 3742-27 207-50 IN. CONTACT AREA EACH TIME			
R1A	NW-SE runway 1st 500 ft. sta 0+00 to 5+00 200-ft width east side	Capacity	155,000+	85,000+	155,000+	220,000+	200,000+	330,000+	230,000+	380,000+	800,000+	600,000+					
R2B	NW-SE runway 1st 500 ft. sta 0+00 to 5+00 100-ft width west	Capacity	155,000+	85,000+	155,000+	220,000+	200,000+	330,000+	230,000+	380,000+	800,000+	600,000+					
R3B	NW-SE runway 2nd 500 ft. sta 5+00 to 10+00	Capacity	155,000+	85,000+	155,000+	220,000+	200,000+	330,000+	230,000+	380,000+	800,000+	600,000+					
R4C	Runway interior sta 10+00 to 50+00	Capacity	155,000+	85,000+	155,000+	220,000+	200,000+	330,000+	230,000+	380,000+	800,000+	600,000+					
R5C R12C	Runway interior sta 50+00 to 55+00, sta 70+40 to 72+00	Capacity	155,000+	85,000+	155,000+	220,000+	200,000+	330,000+	230,000+	380,000+	800,000+	600,000+					
R6C	Runway interior sta 55+00 to 70+40	Capacity	155,000+	85,000+	155,000+	220,000+	200,000+	330,000+	230,000+	380,000+	800,000+	600,000+					
R7C	Runway interior sta 72+00 to 80+00	Capacity	155,000+	85,000+	155,000+	220,000+	200,000+	330,000+	230,000+	380,000+	800,000+	580,000					
R8C	Runway interior sta 80+00 to 89+80	Capacity	155,000+	85,000+	155,000+	220,000+	200,000+	330,000+	230,000+	380,000+	800,000+	600,000+					
R9C	Runway interior sta 89+80 to 110+00	Capacity	155,000+	85,000+	155,000+	220,000+	200,000+	330,000+	230,000+	380,000+	800,000+	600,000+					

Note: + sign denotes allowable gross loading greater than maximum gross weight of any existing aircraft having indicated gear configuration.  
(s) denotes allowable gross loading less than minimum gross weight of any existing aircraft having indicated gear configuration.

Note: + sign denotes allowable gross loading greater than maximum gross weight of any existing aircraft having indicated gear configuration.  
(a) denotes allowable gross loading less than minimum gross weight of any existing aircraft having indicated gear configuration.

(1 of 3 sheets)

EDITION OF AUG 1965 IS OBSOLETE.

WES FORM NO. 999  
JUNE 1972

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Table 5 (Continued)  
SUMMARY OF PAVEMENT EVALUATION

NAME OF AIRFIELD Kincheloe AFB			LOAD-CARRYING CAPACITY IN LB OF GROSS PLANE LOAD FOR INDICATED LANDING GEAR TYPES AND CONFIGURATIONS														
DATE OF EVALUATION			TRICYCLE ARRANGEMENT														
MONTH-April			YEAR-1972														
FEATURE		PAVEMENT OPERATIONAL USE	SINGLE 100-PSI TIRE PRESSURE	SINGLE 100-PSI. CONTACT AREA	SINGLE 24" SQ-IN. CONTACT AREA	TM 28 IN. C-C 226-SQ-IN. CONTACT AREA EACH TIRE	SINGLE TANDUM 80-IN. SPACING 24" SQ-IN. CONTACT AREA	TM 37 IN. C-C 287-SQ-IN. CONTACT AREA EACH TIRE	TM 44 IN. C-C 330-SQ-IN. CONTACT AREA EACH TIRE	TM 51 IN. C-C 380-SQ-IN. CONTACT AREA EACH TIRE	C-5A GEAR CONFIGURATION	BICYCLE	REMARKS				
NO.	DESIGNATION		1	2	3	4	5	6	7	8	9	10					
R10B	NW-SE runway 2nd 500 ft. sta 110+00 to 115+00	Capacity	155,000+	85,000+	155,000+	220,000+	200,000+	330,000+	230,000+	380,000+	800,000+	600,000+					
R11A	NW-SE runway 1st 500 ft. sta 115+00 to 120+00	Capacity	155,000+	85,000+	155,000+	220,000+	200,000+	330,000+	230,000+	380,000+	800,000+	600,000+					
T1A	South connecting taxiway	Capacity	155,000+	85,000+	155,000+	220,000+	200,000+	330,000+	230,000+	380,000+	800,000+	600,000+					
T2A	Parallel taxiway	Capacity	155,000+	85,000+	155,000+	220,000+	200,000+	330,000+	230,000+	380,000+	800,000+	600,000+					
T3A	North connecting taxiway	Capacity	155,000+	85,000+	155,000+	220,000+	200,000+	330,000+	230,000+	380,000+	800,000+	600,000+					
T4A	SAC operation apron taxiway	Capacity	155,000+	85,000+	155,000+	220,000+	200,000+	330,000+	230,000+	380,000+	800,000+	600,000+					
T5A	SAC access taxiways 1 & 2	Capacity	155,000+	85,000+	155,000+	220,000+	200,000+	330,000+	230,000+	380,000+	800,000+	600,000+					
T15C	Taxiway 9	Capacity	155,000+	85,000+	155,000+	220,000+	200,000+	330,000+	230,000+	380,000+	800,000+	600,000+					
T6C	Taxiway 11	Capacity	155,000+	85,000+	155,000+	220,000+	200,000+	330,000+	230,000+	380,000+	800,000+	600,000+					
T7B	Taxiway A	Capacity	155,000+	85,000+	155,000+	220,000+	200,000+	330,000+	230,000+	380,000+	800,000+	600,000+					
T11B	ADC connecting taxiway	Capacity	155,000+	85,000+	155,000+	220,000+	200,000+	330,000+	230,000+	380,000+	800,000+	600,000+					
A1B	SAC operational apron	Capacity	155,000+	85,000+	155,000+	220,000+	200,000+	330,000+	230,000+	380,000+	800,000+	600,000+					
A2B	SAC hanger access aprons & taxiways (1-4)	Capacity	155,000+	85,000+	155,000+	220,000+	200,000+	330,000+	230,000+	380,000+	800,000+	600,000+					
A3B	SAC alert aprons & taxiways	Capacity	155,000+	85,000+	155,000+	220,000+	200,000+	330,000+	230,000+	380,000+	800,000+	600,000+					
A4B	North warm-up apron	Capacity	155,000+	85,000+	155,000+	220,000+	200,000+	330,000+	230,000+	380,000+	800,000+	600,000+					

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JUNE 1972

EDITION OF AUG 1960 IS OBSOLETE.

(2 of 3 sheets)

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Table 5 (Concluded)  
SUMMARY OF PAVEMENT EVALUATION

NAME OF AIRFIELD: Kincheloe AFB			LOAD-CARRYING CAPACITY IN LB OF GROSS PLANE LOAD FOR INDICATED LANDING GEAR TYPES AND CONFIGURATIONS											
DATE OF EVALUATION MONTH April YR 1972			TRICYCLE ARRANGEMENT											
NO.	FEATURE		PAVEMENT OPERATIONAL USE	SINGLE 100-PSI TIRE PRESSURE	SINGLE 100-SQ-IN. CONTACT AREA	SINGLE 24" SQ-IN. CONTACT AREA	TR 28 IN. C-C 28" SQ-IN. CONTACT AREA EACH TIRE	SINGLE TANDEM 80-IN. SPACING 400-SQ-IN. CONTACT AREA	TR 37 IN. C-C 28" SQ-IN. CONTACT AREA EACH TIRE	TR 44 IN. C-C 80-SQ-IN. CONTACT AREA EACH TIRE	TR 10 TANDEM 33 IN. C-C 208-SQ-IN. CONTACT AREA EACH TIRE	CSA GEAR CONFIGURATION	BICYCLE TR 10 TAN 37" C-C 207-SQ-IN. CONTACT AREA EACH TIRE	REMARKS
	DESIGNATION													
A5B	South ramp-up apron		Capacity	155,000+	85,000+	155,000+	220,000+	200,000+	330,000+	230,000+	380,000+	800,000+	590,000	
A6B	ADC operational apron		Capacity	45,000	30,000	75,000	70,000	115,000	85,000	125,000	155,000	440,000	(a)	
A7B	ADC parking apron													
Note:			Evaluation not required for first criteria as subgrade is considered to be nonfrost-susceptible.											

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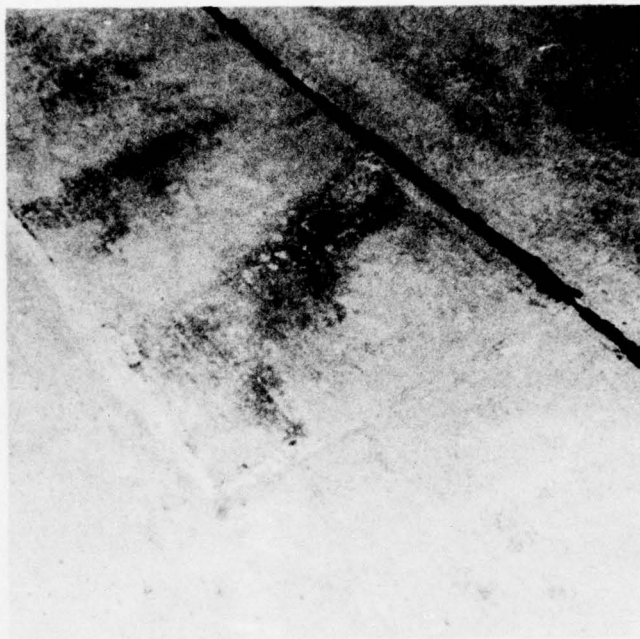


Photo 1. Spall repaired with PCC (in good condition)

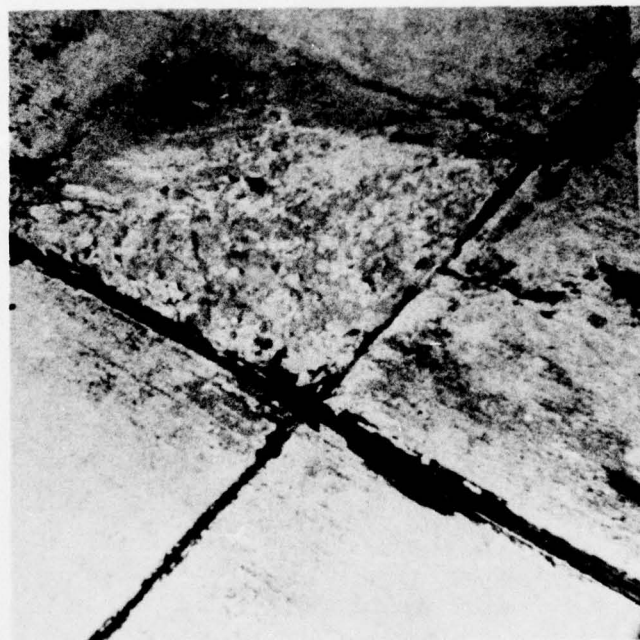


Photo 2. Spall repaired with PCC (deteriorating)

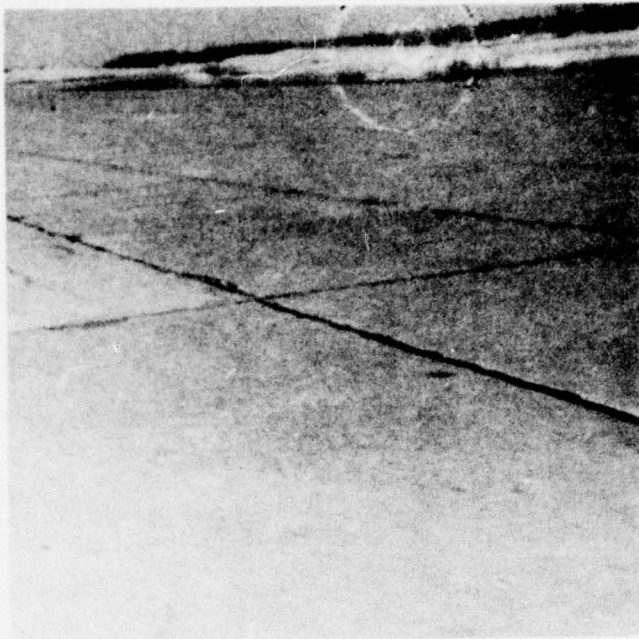


Photo 3. Condition of ADC parking apron

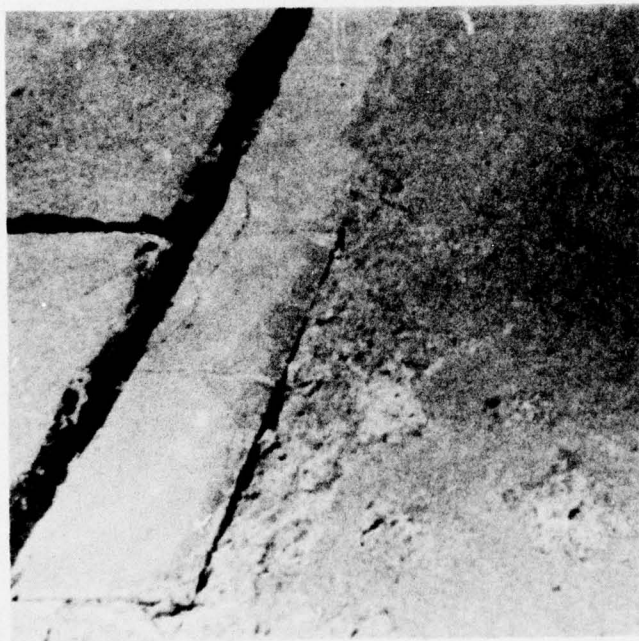


Photo 4. Spall repair on ADC parking apron





Photo 5. Condition of ADC operational apron

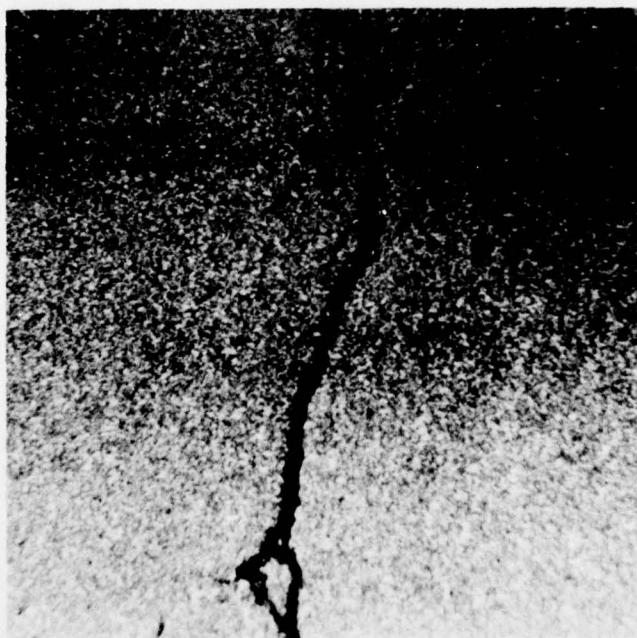
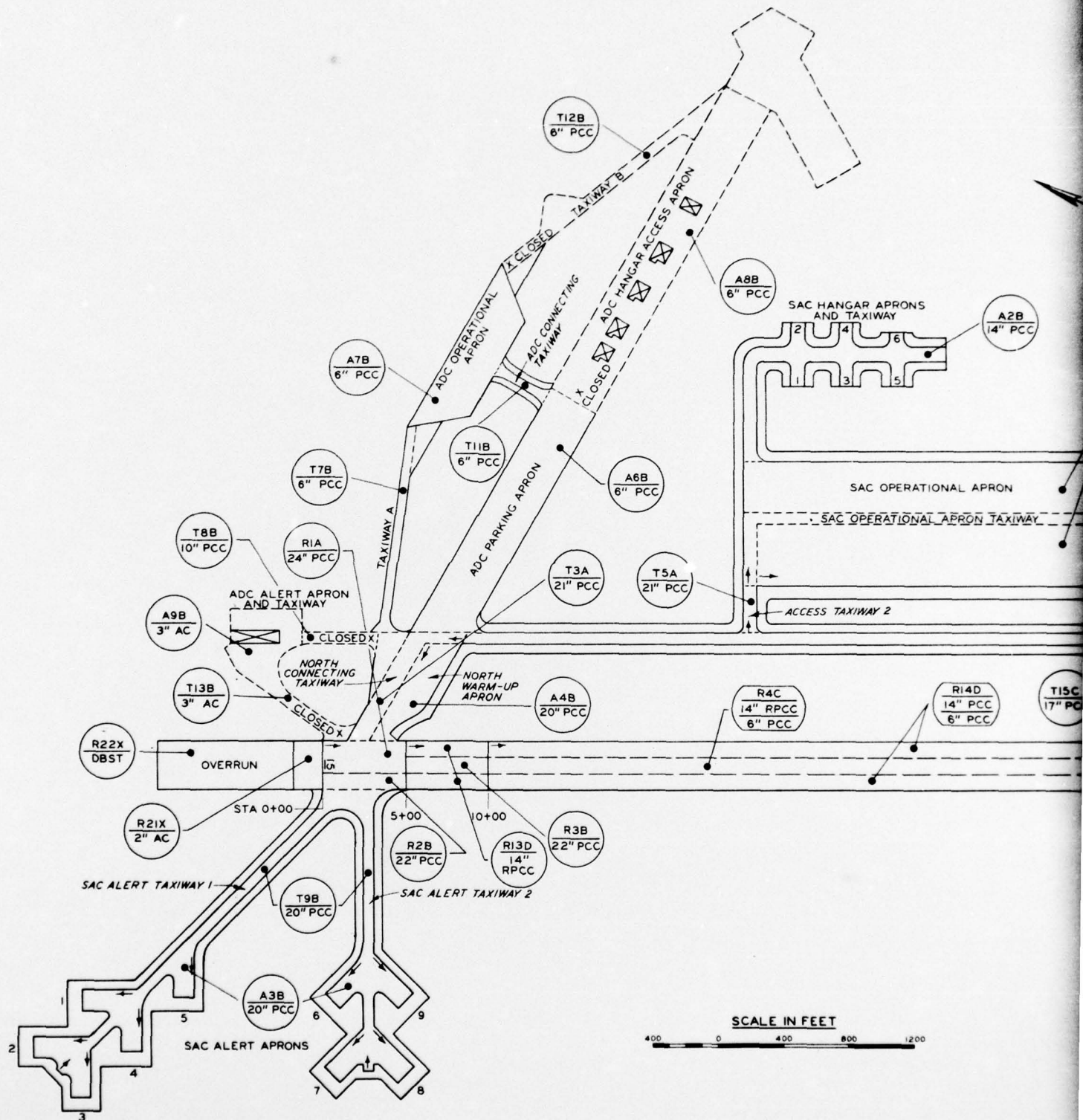


Photo 6. Longitudinal crack in north overrun



# LEGEND

RIA  
 24" PCC ← FEATURE DESIGNATION (SEE NOTE 1)  
 ← SURFACE PAVEMENT THICKNESS AND TYPE

## TYPE OF FEATURE

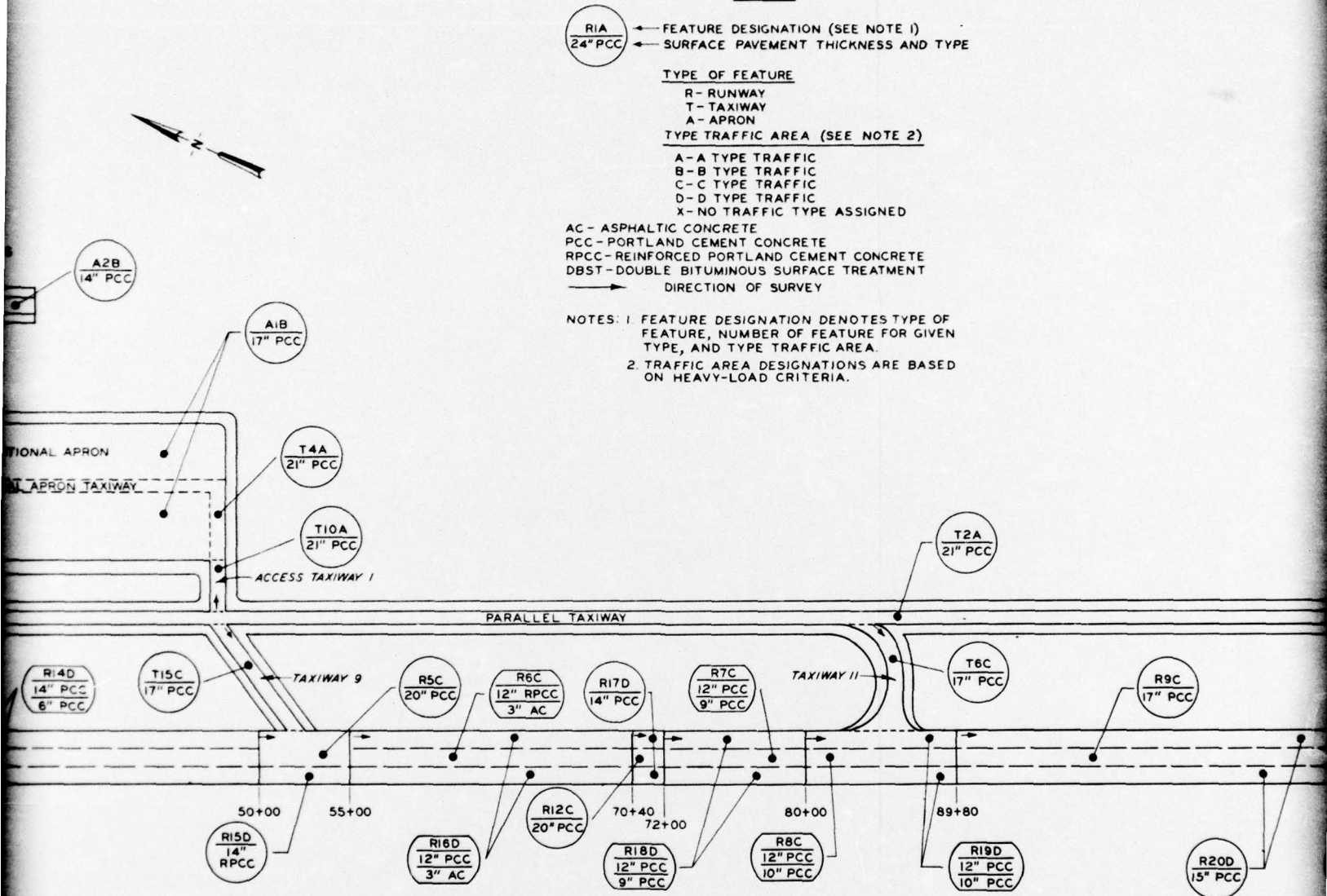
R - RUNWAY  
 T - TAXIWAY  
 A - APRON

## TYPE TRAFFIC AREA (SEE NOTE 2)

A - A TYPE TRAFFIC  
 B - B TYPE TRAFFIC  
 C - C TYPE TRAFFIC  
 D - D TYPE TRAFFIC  
 X - NO TRAFFIC TYPE ASSIGNED

AC - ASPHALTIC CONCRETE  
 PCC - PORTLAND CEMENT CONCRETE  
 RPCC - REINFORCED PORTLAND CEMENT CONCRETE  
 DBST - DOUBLE BITUMINOUS SURFACE TREATMENT  
 → DIRECTION OF SURVEY

NOTES: 1. FEATURE DESIGNATION DENOTES TYPE OF  
 FEATURE, NUMBER OF FEATURE FOR GIVEN  
 TYPE, AND TYPE TRAFFIC AREA.  
 2. TRAFFIC AREA DESIGNATIONS ARE BASED  
 ON HEAVY-LOAD CRITERIA.





# LEGEND

RIA  
24" PCC

← FEATURE DESIGNATION (SEE NOTE 1)  
← SURFACE PAVEMENT THICKNESS AND TYPE

## TYPE OF FEATURE

R - RUNWAY  
T - TAXIWAY  
A - APRON

## TYPE TRAFFIC AREA (SEE NOTE 2)

A - A TYPE TRAFFIC  
B - B TYPE TRAFFIC  
C - C TYPE TRAFFIC  
D - D TYPE TRAFFIC  
X - NO TRAFFIC TYPE ASSIGNED

AC - ASPHALTIC CONCRETE

PCC - PORTLAND CEMENT CONCRETE

RPCC - REINFORCED PORTLAND CEMENT CONCRETE

DBST - DOUBLE BITUMINOUS SURFACE TREATMENT

→ DIRECTION OF SURVEY

NOTES: 1. FEATURE DESIGNATION DENOTES TYPE OF FEATURE, NUMBER OF FEATURE FOR GIVEN TYPE, AND TYPE TRAFFIC AREA.

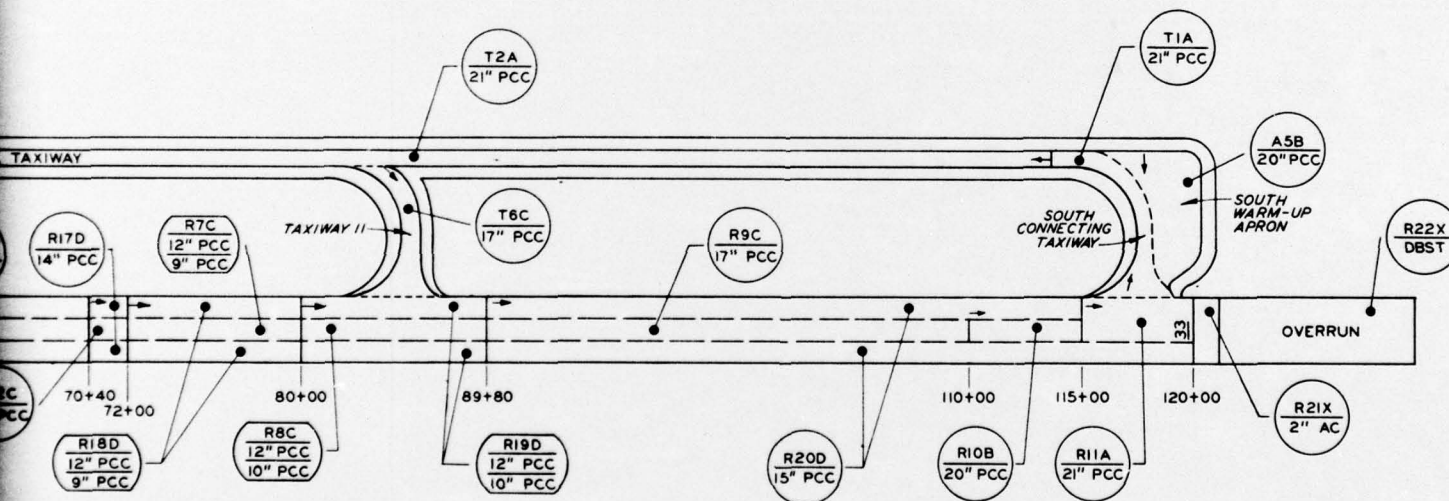
2. TRAFFIC AREA DESIGNATIONS ARE BASED ON HEAVY-LOAD CRITERIA.



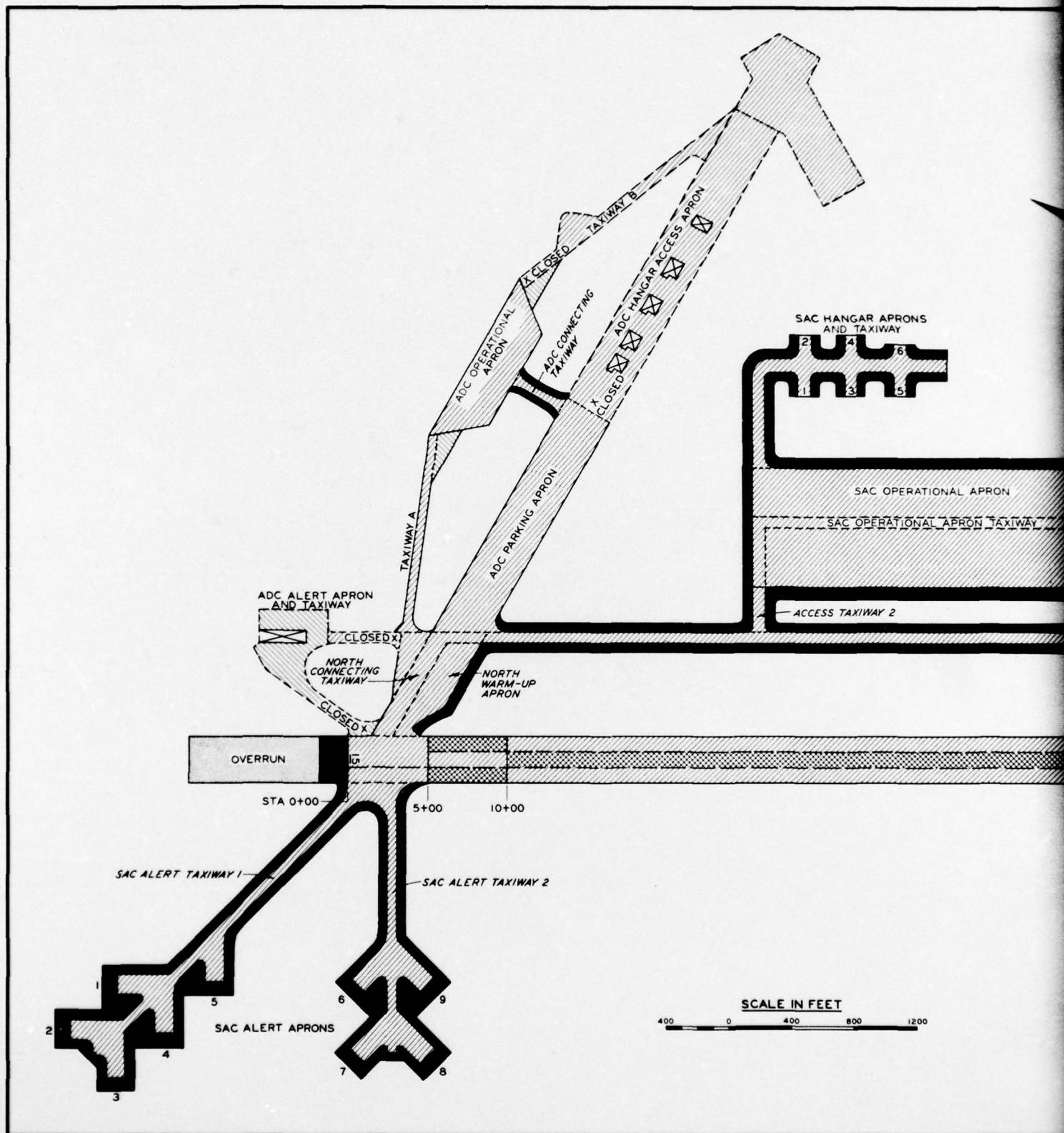
VICINITY MAP

SCALE IN MILES

10 0 10 20 30



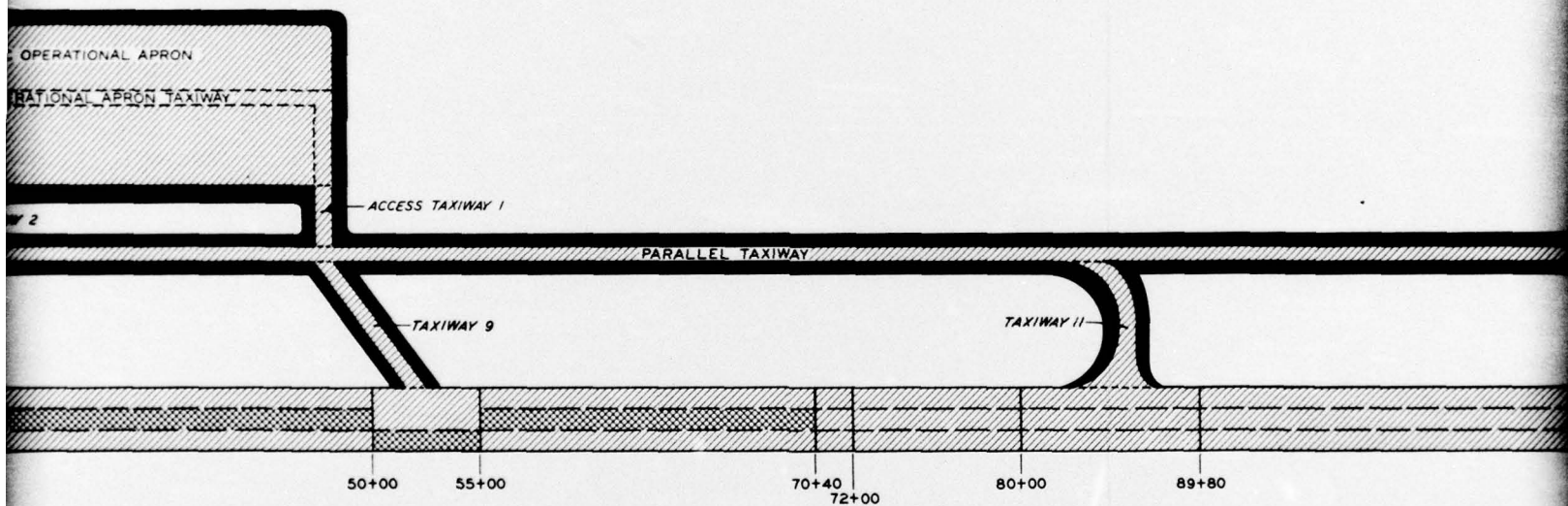
KINCHELOE AFB  
AIRFIELD LAYOUT










LEGEND

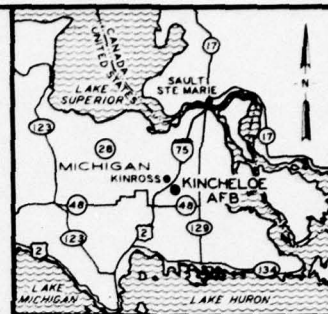
- |  |  |
|--|--|
|  | PORTLAND CEMENT CONCRETE (PCC)             |
|  | REINFORCED PORTLAND CEMENT CONCRETE (RPCC) |
|  | ASPHALTIC CONCRETE (AC)                    |
|  | DOUBLE BITUMINOUS SURFACE TREATMENT (DBST) |
|  | BLAST AND SHOULDER PAVEMENT (NON-TRAFFIC)  |





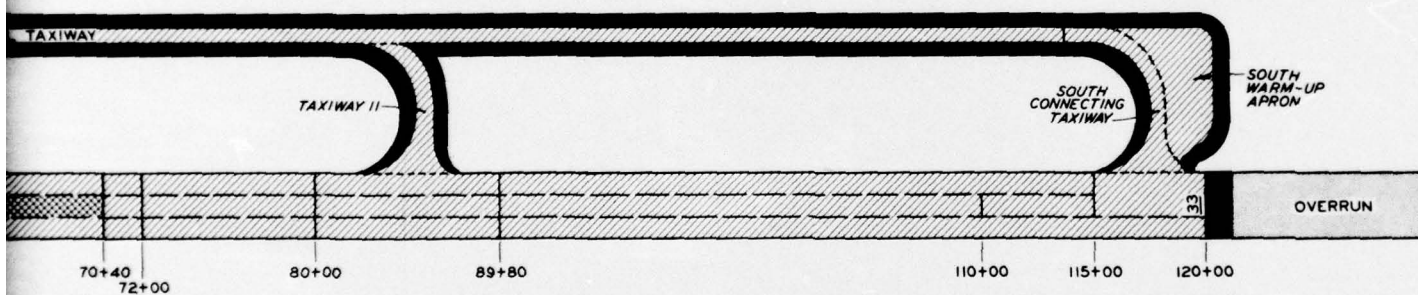
# LEGEND

-  PORTLAND CEMENT CONCRETE (PCC)
-  REINFORCED PORTLAND CEMENT CONCRETE (RPCC)
-  ASPHALTIC CONCRETE (AC)
-  DOUBLE BITUMINOUS SURFACE TREATMENT (DBST)
-  BLAST AND SHOULDER PAVEMENT (NON-TRAFFIC)



VICINITY MAP

SCALE IN MILES  
10 0 10 20 30



KINCHELOE AFB  
PAVEMENT PLAN